sensing a first radial position of a rotor, said rotor comprising a plurality of permanent magnets, with respect to a stator along a first axis, said stator comprising a plurality of independently controlled coil segments magnetically coupled to said permanent magnets;

sensing a second radial position of said rotor with respect to said stator along a second axis; and

delivering current to at least one said coil segment, the amount of said current based on at least one said sensed position;

producing tangential forces on said motor segments; and

producing both torque and bearing forces on said stator and said rotor from said tangential forces.

REMARKS

The Official Action mailed November 21, 2002 has been carefully considered. The claims 1-2, 4, 7, 9-10, 17, 19 and 25 have been amended to overcome the Examiner's formal rejections thereto, and to further define the invention over the art. No new matter has been added to the subject application as a result of the changes made thereto. Reconsideration and allowance of the subject application, as amended, are respectfully requested.

Claims 1-26 stand rejected under 35 USC §102(b) as being anticipated by Mario et al. Applicants respectfully submit this rejection is in error.

The Examiner points to Mario et al as disclosing an integrated motor and magnetic bearing, comprising a rotor 12 comprising a plurality of permanent magnets 14, and a stator comprising a plurality of independently controlled coil segments 18a-18d magnetically coupled to said permanent magnets. Applicants acknowledge Marion et al as so disclosing.

However, Mario et al disclosed the production of radial forces in the a-axis and b-axis (Figure 2) to produce torque and bearing forces. See corresponding description at column 4, lines 1-14; and column 4, lines 65-67.

In contrast, Applicant's invention of independent claim 1 requires an integrated motor and magnetic bearing that includes "motor segments adapted to produce tangential forces thereto, thereby producing both torque and bearing forces on said stator and said rotor from said tangential forces." (Claim 1, as amended) Applicant's invention of independent claims 19 and 25 have been similarly amended. Claims 2-18, 20-24 and 26 each depend directly or indirectly from Applicant's invention of independent claims 1, 19 or 25, and thus be read as incorporating the limitations of these claims.

As provided in Applicant's invention of Figures 2, 3, 4 and 5, the present invention generates tangential forces on the motor segments (e.g. segment 1, segment 2, segment 3, segment 4) to produce resultant forces in the x and y direction. Likewise, theses forces produce a resultant torque either clockwise or counterclockwise. These features are nowhere disclosed or suggested in Mario et al, and thus, Mario et al could not anticipate Applicant's invention of independent claims 1, 19 or 25.

Accordingly, it is respectfully submitted that the Examiner's rejection of claims 1-26 as being anticipated by Mario et al is in error, and should be withdrawn.

Having dealt with all of the objections raised by the Examiner, it is respectfully submitted that the subject application, as amended, is in condition for allowance. Thus, early allowance is earnestly solicited.

If the Examiner desires personal contact for further disposition of this case, the Examiner is invited to call the undersigned Attorney at 603.668.6560.

A check in the amount of $205.00 is included herewith to cover a two month extension of term for small entity, thereby extending the term for response to the present official action from February 21, 2003 to April 21, 2003. No separate petition for an extension of term is believed necessary, but the office should consider the present amendment and an accompanying a check as a formal petition, if necessary.

In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account No. 50-2121.

Respectfully submitted,

Edmund P. Pfleger
Attorney for Applicant
Reg. No. 41,252

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on April 7, 2003 at Manchester, New Hampshire.

By: April Dennis

MARKED COPY OF CLAIMS SHOWING CHANGES MADE

1. An integrated motor and magnetic bearing, comprising:

a rotor comprising a plurality of permanent magnets; and

a stator comprising a plurality of independently controlled [coil]motor segments magnetically coupled to said permanent magnets;

said motor segments adapted to produce tangential forces thereto, thereby producing both torque and bearing forces on said stator and said rotor from said tangential forces.

2. An integrated motor and magnetic bearing as claimed in claim 1, said [coil]motor segments comprising a plurality of coil phases.

4. An integrated motor and magnetic bearing as claimed in claim 1, said integrated motor and magnetic bearing capable of providing simultaneously both rotational torque and [radial] bearing force.

7. An integrated motor and magnetic bearing as claimed in claim [1]3, wherein at least one said sensor is selected from the group consisting of: an encoder, a Hall effect transistor, and a device adapted to measure a voltage generated at least one said coil segment.

9. An integrated motor and magnetic bearing as claimed in claim [1]3, wherein said clearance gap is sized so as to provide vibration isolation.

10. An integrated motor and magnetic bearing as claimed in claim 1, wherein at least one said [redundant coil]motor segment is provided for fault tolerance.

17. An integrated motor and magnetic bearing as claimed in claim 2, wherein said plurality of [coil]motor segments is at least three coil segments.

19. An apparatus for manipulating a shaft comprising:

two integrated motor and mangnetic bearing assemblies, each said assembly comprising a rotor and a stator, each said rotor comprising a plurality of permanent magnets, and each said stator comprising a plurality of independently controlled [coil]motor segments magnetically coupled to said permanent magnets, said motor segments adapted to produce tangential forces thereto, thereby producing both torque and bearing forces on said stator and said rotor from said tangential forces; and

a shaft;

wherein each said assembly is disposed along said shaft.

25. A method for providing integral electromagnetic motor and bearing functions comprising:

sensing a first radial position of a rotor, said rotor comprising a plurality of permanent magnets, with respect to a stator along a first axis, said stator comprising a plurality of independently controlled coil segments magnetically coupled to said permanent magnets;

sensing a second radial position of said rotor with respect to said stator along a second axis; [and]

delivering current to at least one said coil segment, the amount of said current based on at least one said sensed position[.]; and

producing tangential forces on said motor segments; and

producing both torque and bearing forces on said stator and said rotor from said tangential forces.